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10/799,573	03/11/2004	Charles E. Taylor	SHPR-01360USP	6486

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EXAMINER
OLSEN, LIN B

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on <u>14 January 2008</u>.

2a)☒ This action is **FINAL**.   2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) <u>1--21 and 24- 31</u> is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) <u>1-21 and 24-31</u> is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All b)☐ Some * c)☐ None of:

        1.☐ Certified copies of the priority documents have been received.

        2.☐ Certified copies of the priority documents have been received in Application No. _____.

        3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☐ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4)☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____

5)☐ Notice of Informal Patent Application

6)☐ Other: _____.

DETAILED ACTION

The response of 24 January, 2008 is acknowledged.

The Amendments to the specification and claims have been entered.

The objection to claim 24 has been withdrawn.

The rejection of claims 15 and 24 on the basis of nonstatutory obviousness-type double patenting have been withdrawn.

The amendments and arguments to the art rejections to claims 1-2, 4-9, 11-16, 18-21, 24-25, and 27-31 have been withdrawn.

Response to Arguments

Applicant's arguments filed 24 January, 2008 relative to the objection to the specification have been fully considered but they are not persuasive.

In the Office Action, the Examiner suggests the phrase "control the operation of" should be "move". The applicant disagreed and quoted lines 2-3 of paragraph 13, to support the phrase "control the operation of". The examiner focuses on lines 5-6 where the specification states "The motion unit 116 can include wheels, tracks, wings, legs, or any other means of locomotion." Although one of ordinary skill in art would recognize wheels, tracks, wings, legs or other means of locomotion are useful for moving a motion unit 116, they would not necessarily see these as means for controlling it. Further , the examiner points out lines 4-5 of paragraph 13, "In one embodiment, the processor 118 uses motion control software 120 to control the motion unit 116." as indicating that the

motion control unit 116 is controlled by a different entity that the wheels, tracks, wings, legs, or other means of locomotion.

In the response to the First Action, pages 13-15, applicant submitted that the combination of Ruffner and Maimon is an improper basis for an obviousness rejection over the present claims. The examiner respectfully disagrees.

Ruffner describes using both amplitude and travel time of ultrasonic pulses in the obstacle detection aspect of a robot (col. 12, lines 8-10). In addition, Ruffner (col. 12, lines 15-27) suggests several alternate ways to detect obstacles that do not use measurement of delay. Ultrasonic pulses travel much slower than electromagnetic pulses and so require much less complex electronics to capture and process.

Maimon criticizes the 'time of fly' measurement techniques of primarily electromagnetic pulses (Col. 1 lines 31-35). However, the time value referenced in claims 1, 3, 8, 10, 15, 17, 24 and 26 is not restricted to the "time of fly" criticized by Maimon. The claims further specify a processor operable to determine distance information based at least in part on the determined time value. This distance determination based on the determined time value is not specified to be based on a "time of fly" time value. Hence Maimon's criticism does not prevent the reference from being used against these claims.

Maimon's method involves timing. Maimon started the measurement with a calibration period described in col. 4 lines 46-56, where a pulse is generated (col. 4 lines 50). The pulse travels from the source and reflects from a target toward a sensor.

(col. 4, line 46-47). The energy from the reflection is allowed to impinge on the sensor

for a relatively long period. After this calibration run, further pulses are allowed to

impinge on the sensor for only a measured time interval. (col. 4 lines 64-67). Therefore

"the total received energy depends on any offset between the gate period and the

duration of receipt of the pulse, ie. The delay due to time of flight" (col. 5, lines 1-3).

Therefore Maimon too determines the distance information based at least in part on a

determined time value. Therefore, the examiner judges that it is not counter indicated to

use the Maimon's distance determination in place of Ruffner's ultrasonic distance

determination method when applied to these claims.

Specification

The disclosure is objected to because of the following informalities:

The Examiner suggests the phrase "control the operation of" on page 3; line 3, of

the specification should be "move". The examiner focuses on lines 5-6 of the same

page where the specification states "The motion unit 116 can include wheels, tracks,

wings, legs, or any other means of locomotion." One of ordinary skill in art would

recognize wheels, tracks, wings, legs or other means of locomotion are useful for

moving a motion unit 116, but not necessarily for controlling it. Further , the examiner

points out lines 4-5 of paragraph 13, "In one embodiment, the processor 118 uses

motion control software 120 to control the motion unit 116." as indicating that the motion

control unit 116 is itself controlled.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims **1, 8, 15 and 24** are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The claims recite "an array of detectors" while the specification describes a 2D or two-dimensional array of detectors.

Claims **1, 8, 15 and 24** are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential structural cooperative relationships of elements, such omission amounting to a gap between the necessary structural connections. See MPEP § 2172.01. The omitted structural cooperative relationships are: Apparatus claims 1 and 15 claim recite "a memory device storing data corresponding to at least one counter configured to determine a time value", while method claims 8 and 24 recite "storing data in a memory device of a robot, the memory device corresponding to at least one counter configured to determine a time value". The specification describes counters as being associated with the detectors in the array and a time value accumulated in the counters as being associated with the time until a reflected pulse is

received. The specification then describes the counter values being sent to the memory device for storage. The cooperative relationship between the counters, detectors and the memory is not evident in the claim language.

Claims **8 and 24** are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The claim recites "storing data in a memory device of a robot, the memory device corresponding to at least one counter configured to determine a time value." The examiner suggests that the data stored in the memory device corresponds to the at least one counter, not the memory device itself.

Claims **2, 4-7, 9, 11-14, 16, 18-21 and 25, 27-31** are rejected for incorporating the above errors from the parent claims by dependency.

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims **1, 3, 8, 10, 15, 17, 24 and 26** are rejected under 35 U.S.C. 103(a) as being unpatentable over by U.S. Patent No. 6,338,013 to Ruffner (hereafter referred to as Ruffner) in view of U.S. Patent No. 6,480,265 to Maimon et al. (hereafter referred to as Maimon). Ruffner describes a multifunctional mobile appliance. Maimon is concerned with accurately measuring the distance from a robot to a target. Claims 8, 10, 24 and 26

are the method version of claims 1, 3, 15 and 17 and are rejectable for the same reasons as the system claims.

Claims 1, 3, 8, 10, 15, 17, 24 and 26 recite "storing data corresponding to at least one counter configured to determine a time value" This time value is not restricted to the "time of fly" criticized by Maimon. The claims further recite "an optic configured to focus a plurality of reflections of infrared light pulses from the environment of a robot to an array of detectors, and a processor operable to determine distance information based at least in part on the determined time value." This distance determination based on the determined time value is not specified to be a "time of fly" time value.

Maimon's method does involve timing. Maimon started the measurement with a calibration period described in col. 4 lines 46-56, where a pulse is generated (col. 4 lines 50). The pulse travels from the source and reflects from a target toward a sensor. (col. 4, line 46-47). The energy from the reflection is allowed to impinge on the sensor for a relatively long period. After this calibration run, further pulses are allowed to impinge on the sensor for only a measured time interval. (col. 4 lines 64-67). Therefore "the total received energy depends on any offset between the gate period and the duration of receipt of the pulse, ie. The delay due to time of flight" (col. 5, lines 1-3). Therefore Maimon too determines the distance information based at least in part on the determined time value. Therefore, the examiner judges that it is not counter indicated to use the Maimon's distance determination in place of Ruffner's ultrasonic measurement method when applied to these claims.

Regarding **claims 1 and 15**, "A robot" reads on a multifunctional mobile appliance capable of performing a variety of tasks out of sight of an owner as illustrated in Ruffner Figs 1 and 8. "a motion unit" reads on a mobile unit (1) Col. 4, line 67 and as shown in Fig.1. "an array of detectors supported by the motion unit" Ruffner in Fig.2 shows two proximity detectors 36 and 37 on the motion unit for detecting obstacles. "a memory device storing data corresponding to at least one counter configured to determine a time value." Ruffner in Fig. 8 shows a controller/processor 66 receiving inputs from an obstacle detector 70 and user input 67. As detailed in col. 15 lines 60-63 the controller/processor 66 has stored variables, which indicates that memory is available in the controller/processor 66.

"an infrared sensor operatively coupled to the memory device, the infrared sensor including: (a) an infrared light source configured to produce a plurality of pulses of infrared light directed toward an environment of the robot; (b) at least one optics configured to focus a plurality of reflections of the infrared light pulses from the environment of the robot to the array of detectors" " partially reads on the first obstacle avoidance mechanism described in Ruffner Col. 12, lines 2-27. At lines 15-18 Ruffner indicates that the ultrasonic transducers can be replaced by radar or lidar (light detecting and ranging) means. At line 18, Ruffner discusses bouncing ultrasonic pulses off of objects as a means to detect obstacles. Further, Ruffner, at Col. 17, lines 22-24, discusses substituting passive imaging devices such as IR charge-coupled devices (CCDs) for the active proximity detectors 36, 37 implemented with the sonar implementation. It would have been obvious to one of ordinary skill in the art at the time

of the invention to use infrared pulses a suggested in Ruffner (Col. 3, lines 60 – 61) to

detect obstacles. Further, even if Ruffner did not fully detail using light pulses to detect

objects, Maimon in the embodiment of Figure 10, uses light pulses and instead of a

single receiver uses an array 60 of receivers 62 to detect the reflections of the beam.

(Col. 6, lines 35-56). Col 6, lines 53-54 details using CCD devices to capture reflections

and optics to focus the reflections. It would have been obvious to one of ordinary skill in

the art at the time of the invention substitute Maimon's receiver that provides more

detail at minimal cost for Ruffner's limited obstacle detection. In Fig. 10, Maimon shows

an alternate embodiment described in Col. 6, lines 35-56 that uses a 2D array (60) of

sensors (62) replacing the single detector previously used. "at least one processor

operatively coupled to the memory device, the processor operable to determine

distance information based at least in part on the determined time value. Reads on the

controller/processor (66) as illustrated in Ruffner Fig 8, which in the Ruffner/Maimon

combination would receive data from the optical detector array 60. At Col. 12, line 8,

and Col. 36, lines 35-41, Ruffner describes mapping the data about the reflections to

obtain a snap shot of objects in the environment.

Regarding **claims 3 and 10,** which depend on claims 1 and 8 respectively, ""the

determined distance is produced by measuring an energy of a reflected pulse up to a

cutoff time" reads on the Ruffner/Maimon combination which would determine the

distance to a target by measuring the energy received in a reflected pulse during a

gated interval, Col 4, lines 64-67. (Energy is defined at Col. 1, lines 53-55, as the

integral of the brightness or amplitude of the beam, which is a measurement that is

easily obtained from a detector such as a charge coupled device (CCD)) It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate Maimon's distance measurement technique with Ruffner's automatic appliance because, while sonic waves move slowly enough to time the reflections, light waves travel faster and the time to an infrared reflection would be more expensive to measure than the sonic reflection. Maimon can adjust the gated interval to allow the energy measurement technique to accommodate the environment and thereby use the less expensive CCDs to measure the light reflections.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the
examiner should be directed to LIN B. OLSEN whose telephone number is (571)272-
9754. The examiner can normally be reached on Mon - Fri, 8:30 -5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's
supervisor, Thomas G. Black can be reached on 571-272-6956. The fax phone number
for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the
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system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/L. B. O./
Examiner, Art Unit 3661

/Thomas G. Black/

Supervisory Patent Examiner, Art Unit 3661